

What is claimed is:

1. A filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

5 a plurality of point ionization sources, each of said plurality of point ionization sources located in the proximity of the periphery of said air flow channel and being oriented to generate ions in the proximity of said air flow channel in a direction generally upstream from each respective one of said plurality of point ionization sources, said ions predominately having an electrical charge with respect
10 to ground; and

a particulate collection surface positioned within said air flow channel in a downstream direction from said plurality of point ionization sources, said particulate collection surface being electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions.

15

2. A filtration system as in claim 1 wherein each of said plurality of point ionization sources comprises an ionization head having a major longitudinal axis.

3. A filtration system as in claim 2 in which said major longitudinal axis of
20 said ionization head is oriented in an orientation angle with respect to said upstream to downstream direction and wherein said orientation angle is not more than sixty degrees inward toward said air flow channel and not more than ninety degrees outward away from said air flow channel.

25 4. A filtration system as in claim 2 wherein said ionization head comprises a multi-point ionization head.

5. A filtration system as in claim 1 further comprising a fan arranged for
operative use with said air flow channel for moving said air in said upstream to
30 downstream direction through said air flow channel.

6. A filtration system as in claim 1 wherein said particulate collection surface comprises a filter.

7. A filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

a plurality of point ionization sources, each of said plurality of point ionization sources located in the proximity of the periphery of said air flow channel and being oriented to generate ions in the proximity of said air flow channel in a direction generally upstream from each respective one of said plurality of point ionization sources, said ions predominately having an electrical charge with respect to ground;

a particulate collection surface positioned within said air flow channel in a downstream direction from said plurality of point ionization sources, said particulate collection surface being electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions;

an ion trap positioned within said air flow channel between said plurality of ionization sources and said particulate collection surface, said ion trap being relatively electrically neutral as compared with said particulate collection surface and said ions.

8. A filtration system as in claim 7 wherein each of said plurality of point ionization sources comprises an ionization head having a major longitudinal axis.

9. A filtration system as in claim 8 in which said major longitudinal axis of said ionization head is oriented in an orientation angle with respect to said upstream to downstream direction and wherein said orientation angle is not more than sixty degrees inward toward said air flow channel and not more than ninety degrees outward away from said air flow channel.

10. A filtration system as in claim 8 which further comprises a plurality of flow channels, one of each of said plurality of flow channels at least partially surrounding at least a portion of each respective one of said plurality of point ionization sources.

11. A filtration system as in claim 10 in which a portion of said air flow is directed past said ionization head in a direction generally opposite to said upstream to downstream direction.

12. A filtration system as in claim 11 wherein said portion of said air flow is air flow which is downstream of said particulate collection surface.

13. A filtration system as in claim 11 in which said portion of said air flow is directed through at least one of said plurality of flow channels.

14. A filtration system as in claim 13 wherein each of said plurality of flow channels has a major longitudinal axis and wherein said major longitudinal axis of each of said plurality of flow channels is generally parallel to said major longitudinal axis of said ionization head.

15. A filtration system as in claim 14 wherein said ionization head comprises a multi-point ionization head.

16. A filtration system as in claim 13 further comprising a fan arranged for operative use with said air flow channel for moving said air in said upstream to downstream direction through said air flow channel.

17. A filtration system as in claim 13 wherein said particulate collection surface comprises a filter.

18. A filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

a point ionization source having a major longitudinal axis, said point ionization source being oriented to generate ions in the proximity of said air flow channel in a direction generally upstream from said point ionization source, said ions predominately having an electrical charge with respect to ground;

a particulate collection surface positioned within said air flow channel in a downstream direction from said point ionization source, said particulate collection surface being electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions; and

5 an ion trap positioned within said air flow channel between said plurality of ionization sources and said particulate collection surface, said ion trap being relatively electrically neutral as compared with said particulate collection surface and said ions;

10 a portion of said air flow being directed past said ionization source in a direction generally opposite to said upstream to downstream direction.

19. A filtration system as in claim 18 wherein said portion of said air flow is air flow which is downstream of said particulate collection surface.

15 20. A filtration system as in claim 18 which further comprises a flow channel at least partially surrounding at least a portion of said point ionization source.

20 21. A filtration system as in claim 20 in which said portion of said air flow is directed through said plurality of flow channel.

22. A filtration system as in claim 21 wherein said flow channel has a major longitudinal axis and wherein said major longitudinal axis of said flow channel is generally parallel to said major longitudinal axis of said ionization head.

25 23. A filtration system as in claim 18 wherein said ionization head comprises a multi-point ionization head.

30 24. A filtration system as in claim 18 further comprising a fan arranged for operative use with said air flow channel for moving said air in said upstream to downstream direction through said air flow channel.

25. A filtration system as in claim 18 wherein said particulate collection surface comprises a filter.

26. A filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

a point ionization source having a major longitudinal axis, said point ionization source being oriented to generate ions in the proximity of said air flow channel in a direction generally upstream from said point ionization source, said ions predominately having an electrical charge with respect to ground;

a particulate collection surface positioned within said air flow channel in a downstream direction from said point ionization source, said particulate collection surface being electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions;

an ion trap positioned within said air flow channel between said plurality of ionization sources and said particulate collection surface, said ion trap being relatively electrically neutral as compared with said particulate collection surface and said ions; and

a fan arranged for operative use with said air flow channel for moving said air in said upstream to downstream direction through said air flow channel;

a portion of said air flow which is downstream of said particulate collection surface being driven by said fan past said ionization source in a direction generally opposite to said upstream to downstream direction.

27. A filtration system as in claim 26 which further comprises a flow channel at least partially surrounding at least a portion of said point ionization source;

28. A filtration system as in claim 27 in which said portion of said air flow is directed through said plurality of flow channel.

29. A filtration system as in claim 28 wherein said flow channel has a major longitudinal axis and wherein said major longitudinal axis of said flow channel is generally parallel to said major longitudinal axis of said ionization head.

30. A filtration system as in claim 27 wherein said ionization head comprises a multi-point ionization head.

5 31. A filtration system as in claim 28 wherein said particulate collection surface comprises a filter.

32. A filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

10 a point ionization source being oriented to generate ions in the proximity of said air flow channel, said ions predominately having an electrical charge with respect to ground; and

a particulate collection surface positioned within said air flow channel in a downstream direction from said point ionization source, said particulate collection surface being electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions;

15 a portion of said air flow being directed past said ionization source in a direction generally opposite to said upstream to downstream direction.

20 33. A filtration system as in claim 32 wherein said portion of said air flow is air flow which is downstream of said particulate collection surface.

34. A filtration system as in claim 32 which further comprises a flow channel at least partially surrounding at least a portion of said point ionization source.

25

35. A filtration system as in claim 34 in which said portion of said air flow is directed through said flow channel.

30 36. A filtration system as in claim 32 wherein said ionization head comprises a multi-point ionization head.

37. A filtration system as in claim 32 further comprising a fan arranged for operative use with said air flow channel for moving said air in said upstream to downstream direction through said air flow channel.

5 38. A filtration system as in claim 32 wherein said particulate collection surface comprises a filter.

39. A portable filtration system for filtering particulates from air flowing in an upstream to downstream direction in an air flow channel, comprising:

10 a portable housing forming an air flow channel;
a channel filter particulate collection surface positioned within said air flow channel said particulate collection surface being electrostatically charged and
an axial fan arranged for operative use with said air flow channel for moving said air in said upstream to downstream direction through said air flow
15 channel.

40. A filtration system as in claim 39 further comprising a point ionization source being oriented to generate ions in the proximity of said air flow channel, said ions predominately having an electrical charge with respect to ground wherein said particulate
20 collection surface is located in a downstream direction from said point ionization source and is electrostatically charged in an opposite direction with respect to ground than said electrical charge of said ions.

41. A filtration system as in claim 40 wherein said axial fan is positioned
25 within said air flow channel.

42. A filtration system as in claim 41 wherein said point ionization source generates said ions in a direction generally upstream from said point ionization source.

30 43. A filtration system as in claim 41 comprising a plurality of point ionization sources, each of said plurality of point ionization sources being oriented to generate ions in

the proximity of said air flow channel, said ions predominately having an electrical charge with respect to ground.

5 44. A filtration system as in claim 43 wherein said plurality of point ionization sources generate said ions in a direction generally upstream from said plurality of point ionization sources.

10 45. A filtration system as in claim 44 wherein each of said plurality of point ionization sources comprises an ionization head having a major longitudinal axis and in which said major longitudinal axis of said ionization head is oriented in an orientation angle with respect to said upstream to downstream direction and wherein said orientation angle is not more than sixty degrees inward toward said air flow channel and not more than ninety degrees outward away from said air flow channel.

15 46. A filtration system as in claim 45 in which a portion of said air flow is directed past said ionization head in a direction generally opposite to said upstream to downstream direction.

20 47. A filtration system as in claim 46 wherein said portion of said air flow is air flow which is downstream of said particulate collection surface.